

BLUEBIRD BIO, INC.

COMPENSATION COMMITTEE CHARTER

I. General Statement of Purpose

The Compensation Committee of the Board of Directors (the “**Compensation Committee**”) of bluebird bio, Inc. (the “**Company**”), on behalf of the Board of Directors (the “**Board**”), discharges the Board’s responsibilities relating to compensation of the Company’s directors and executives, oversees the Company’s overall compensation structure, policies and programs, reviews the Company’s processes and procedures for the consideration and determination of director and executive compensation, and is responsible for producing a report for inclusion in the Company’s proxy statement relating to its annual meeting of stockholders or annual report on Form 10-K, as applicable, in accordance with applicable rules and regulations.

II. Composition

The number of individuals serving on the Compensation Committee shall be fixed by the Board from time to time but shall consist of no fewer than two members, each of whom shall satisfy the independence standards established pursuant to Rule 5605(a)(2) and Rule 5605(d)(2) of the Stock Market Rules of The NASDAQ Stock Market LLC (the “**NASDAQ Stock Market Rules**”), subject to any applicable exceptions contained in the NASDAQ Stock Market Rules. In determining the independence of the members of the Compensation Committee, the Board will consider all factors specifically relevant to determining whether a director has a relationship to the Company which is material to that director’s ability to be independent from management in connection with the duties of a Compensation Committee member, including, but not limited to, the factors enumerated in Rule 10C-1 under the Securities Exchange Act of 1934, as amended (the “**Exchange Act**”). In addition, the Board will also consider whether the members qualify as “non-employee directors” as defined in Rule 16b-3 under the Exchange Act, and as “outside directors” as defined in Section 162(m) of the Internal Revenue Code of 1986, as amended.

The members of the Compensation Committee shall be appointed annually by the Board and may be replaced or removed by the Board at any time, with or without cause. Resignation or removal of a Director from the Board, for whatever reason, shall automatically constitute resignation or removal, as applicable, from the Compensation Committee. The Board may fill any vacancies occurring in the Compensation Committee that may arise for whatever reason. The Board shall designate one member of the Compensation Committee to serve as Chairman of the Compensation Committee.

III. Meetings

The Compensation Committee shall meet as often as it determines is appropriate to carry out its responsibilities. The Compensation Committee may meet in person or by telephone conference or other communications equipment by means of which all persons participating in the meeting can hear each other. A majority of the members of the Compensation Committee shall constitute a quorum for purposes of holding a meeting and the Compensation Committee

may act by a vote of a majority of members present at such meeting. In lieu of a meeting, the Compensation Committee may act by unanimous written consent in accordance with the Company's bylaws. The Chairman of the Compensation Committee, in consultation with the other members and management, may set meeting agendas consistent with this Charter.

IV. Compensation Committee Activities

The Compensation Committee's purpose and responsibilities shall be to:

A. Review of Charter

1. Review and reassess the adequacy of this Charter annually and submit any proposed changes to the Board for approval. The Charter is intended to satisfy the requirements of Rule 5605(d)(1) of the NASDAQ Stock Market Rules.

B. Review Processes and Procedures for Considering and Determining Director and Executive Compensation

1. Periodically review and reassess (and, where appropriate, make such recommendations to the Board as the Compensation Committee deems advisable with regard to) the Company's processes and procedures for the consideration and determination of director and executive compensation, and the compensation of such other persons as may be designated by the Board, and review and discuss with management any description of such processes and procedures to be included in the Company's proxy statement or annual report on Form 10-K, as applicable.

C. Compensation Committee Report

1. Review and discuss with management the compensation disclosure to be included in the Company's proxy statement or annual report on Form 10-K, as applicable, in accordance with applicable rules and regulations ("CD&A").
2. Based on the Compensation Committee's review and discussions with management regarding the CD&A, make a recommendation to the Board that the CD&A be included in the Company's proxy statement or annual report on Form 10-K, as applicable.
3. Prepare the Compensation Committee Report to be included in the Company's proxy statement or annual report on Form 10-K, as applicable, in accordance with the applicable rules and regulations of the Securities and Exchange Commission, NASDAQ Stock Market Rules, and any other rules and regulations applicable to the Company.

D. Incentive-Compensation and Equity-Based Plans

1. Review and approve grants and awards under incentive-based compensation plans and equity-based plans, in each case consistent with the terms of such plans.
2. Review and make such recommendations to the Board as the Compensation Committee deems advisable with regard to policies and procedures for the grant of equity-based awards by the Company.
3. Administer the Company's incentive-based and equity-based compensation plans, including amending and interpreting such plans and the awards and agreements issued pursuant thereto. Review and approve or, where subject to stockholder approval as required by law or stock exchange requirements, make such recommendations to the Board as the Compensation Committee deems advisable, the adoption or amendment of any incentive, equity-based and other compensatory plans of the Company.

E. Matters Related to Compensation of the Company's Chief Executive Officer

1. Review and approve the corporate goals and objectives that may be relevant to the compensation of the Company's Chief Executive Officer ("CEO").
2. Evaluate the CEO's performance in light of the goals and objectives that were set for the CEO and determine and approve the CEO's compensation based on such evaluation.
3. Ensure that the CEO is not present during voting or deliberation on the CEO's compensation.

F. Matters Related to Compensation of the Executive Officers Other Than the Chief Executive Officer

1. Determine the compensation of all executive officers of the Company other than the CEO; for purposes hereof the term "executive officer" has the meaning ascribed to the term "officer" in Section 16 of the Exchange Act and Rule 16a-1 promulgated thereunder.

G. Matters Related to the Engagement, Compensation and Oversight of Consulting Firms, Independent Legal Counsel or Other Advisors

1. Exercise sole authority to retain, obtain the advice of and terminate any compensation consultant, independent legal counsel or other advisor to assist in the performance of the Compensation Committee's functions. The Compensation Committee shall be directly responsible for the appointment, compensation and oversight of the work of any compensation consultant, independent legal counsel and other adviser retained by the Compensation Committee. For clarity, the Compensation Committee: (i) shall not be required to implement or act consistently with the advice or

recommendations of the compensation consultant, legal counsel or other adviser to the Compensation Committee; and (ii) shall exercise its own judgment in fulfillment of the duties of the Compensation Committee.

2. Exercise sole authority to approve any fees and other retention terms of any compensation consultant, independent legal counsel or other advisor retained by the Compensation Committee.
3. Before any compensation consultant, legal counsel or other adviser (other than (1) in-house legal counsel or (2) any compensation consultant, legal counsel or other adviser whose role is limited to the following activities for which no disclosure would be required under Item 407(e)(3)(iii) of Regulation S-K: (i) consulting on any broad-based plan that does not discriminate in scope, terms, or operation, in favor of executive officers or directors of the Company, and that is available generally to all salaried employees or (ii) providing information that either is not customized for a particular company or that is customized based on parameters that are not developed by the compensation consultant, legal counsel or other adviser, and about which the compensation consultant, legal counsel or other adviser does not provide advice) is selected by, or provides advice to, the Compensation Committee, the Compensation Committee shall take into consideration the following factors:
 - i. The provision of other services to the Company by the person that employs the compensation consultant, legal counsel or other adviser;
 - ii. The amount of fees received from the Company by the person that employs the compensation consultant, legal counsel or other adviser, as a percentage of the total revenue of the person that employs the compensation consultant, legal counsel or other adviser;
 - iii. The policies and procedures of the person that employs the compensation consultant, legal counsel or other adviser that are designed to prevent conflicts of interest;
 - iv. Any business or personal relationship of the compensation consultant, legal counsel or other adviser with a member of the Compensation Committee;
 - v. Any stock of the Company owned by the compensation consultant, legal counsel or other adviser; and
 - vi. Any business or personal relationship of the compensation consultant, legal counsel, other adviser or the person employing the adviser with an executive officer of the Company.

4. For clarity, while the Compensation Committee is required to conduct the independence assessment outlined above with respect to any compensation consultant, legal counsel or other adviser that provides advice to the Compensation Committee, other than in-house legal counsel, the Compensation Committee is not required to retain a compensation consultant, legal counsel or other compensation adviser that is determined to be independent, provided that the Compensation Committee has considered the enumerated independence factors before selecting, or receiving advice from, a compensation adviser. The Compensation Committee may select, or receive advice from, any compensation adviser it prefers, including ones that are not independent, after considering the six independence factors outlined above.

V. Additional Compensation Committee Authority

The Compensation Committee is authorized, on behalf of the Board, to do any of the following, as the Compensation Committee deems necessary or appropriate in its discretion:

A. Compensation of the Company's Directors and Senior Management

1. Review and make such recommendations to the Board as the Compensation Committee deems advisable with regard to the compensation of the directors of the Company, including with respect to any equity-based plans.
2. Provide oversight of management's decisions regarding the compensation of all members of senior management of the Company (other than the CEO and other executive officers described above), including with respect to any incentive-compensation plans and equity-based plans.

VI. General

1. The Compensation Committee may establish and delegate authority to one or more subcommittees, consisting of one or more of its members, when the Compensation Committee deems it appropriate to do so in order to carry out its responsibilities.
2. The Compensation Committee shall make regular reports to the Board concerning areas of the Compensation Committee's responsibility.
3. In carrying out its responsibilities, the Compensation Committee shall be entitled to rely upon advice and information that it receives in its discussions and communications with management and such experts, advisors and professionals with whom the Compensation Committee may consult.
4. The Compensation Committee shall have the authority to request that any officer or employee of the Company, the Company's outside legal counsel,

the Company's independent auditor, or any other professional retained by the Company to render advice to the Company, attend a meeting of the Compensation Committee or meet with any of its members or advisors.

5. The Compensation Committee may perform such other functions as may be requested by the Board from time to time.

Adopted May 5, 2013, subject to effectiveness of the Company's Registration Statement on Form S-1.